

## Verbal morphology in agrammatic and anomic aphasia: comparison of structured vs. narrative elicitation tasks

### Introduction

Individuals with agrammatic aphasia show difficulty producing verb morphology (Arabatzi & Edwards, 2008). Various tasks ranging from spontaneous speech to constrained sentence level tasks have been used to detail these deficits and various subsets of verb inflections have been tested, resulting in mixed findings (see Lee, Milman, & Thompson, 2008 for review). In studies comparing production of finite (e.g., *walks*, *walked*) vs. nonfinite inflection forms (e.g., *walking*, *to walk*), agrammatic speakers show omission and substitution of finite tense markings in the face of relatively preserved nonfinite forms (e.g., LaPointe, 1985; Lee et al., 2008). However, little is known about verbal morphology in fluent aphasic speakers. Recently, Bastiaanse (2011) reported that fluent aphasic individuals may also experience greater difficulty with finite compared to nonfinite verbs in spontaneous speech.

Despite the frequently observed verb morphology deficits in individuals with aphasia, no assessment tool is available for clinical or research purposes to quantify these deficits. In addition, little attention has been paid to the effects of different elicitation tasks on verb inflection deficits in aphasia. In this study, we examined production of verb inflection in agrammatic and anomic aphasia using two different elicitation methods: structured sentence completion and narrative production tasks. For the structured task, we used the Northwestern Assessment of Verb Inflection (NAVI; Lee & Thompson, experimental version), which was developed to assess both finite and nonfinite forms in English, using a sentence completion task. For the narrative task, we used the Cinderella story, one of the most commonly used tasks for eliciting narrative speech samples in aphasia research.

### Methods

#### *Participants*

Ten agrammatic and 10 anomic aphasic individuals were tested. Diagnoses of aphasia type were made based on performance on the Western Aphasia Battery-Revised (Kertesz, 2006), the Northwestern Assessment of Verbs and Sentences (Thompson, experimental version), and spontaneous speech samples. All participants were native, monolingual English speakers with normal or corrected-to-normal vision and hearing.

#### *Materials & Procedure*

*Northwestern Assessment of Verb Inflection (NAVI)*: Using the NAVI, six different inflectional forms were examined in a sentence completion task, as shown in (1). Note that the infinitive and progressive forms are nonfinite (the lexical verb is not inflected for tense), and the latter four are finite forms (tense is marked on the lexical verb).

#### (1) A set of sample stimuli

##### *Nonfinite forms*

- a. The boy likes to eat the hamburger (infinitive)
- b. Now the boy is eating the hamburger (present progressive)

##### *Finite forms*

- c. Everyday the boy eats the hamburger (present singular)

- d. Everyday the boys eat the hamburgers (present plural)
- e. Yesterday the boy ate the hamburger (past irregular)
- f. Yesterday the boy called the woman (past regular)

Participants were presented with a picture depicting an action and a sentence was written under the picture with the verb missing (e.g., *Yesterday the man \_\_\_\_\_ the hamburger*). They were asked to complete the sentence by producing the correct verb form. Temporal adverbs (*yesterday, everyday, now*) were used to provide an obligatory context for target form production. To control for aphasic participants' verb retrieval difficulties, the verb stem was provided in writing next to the stimulus picture. Production of target forms was scored as correct responses.

*Narrative Cinderella story:* Participants were asked to tell the Cinderella story after viewing a wordless picture book depicting the story (without looking at the book). Participants' speech was transcribed and coded using the system described in Thompson et al. (2011). Accuracy was calculated for each of the verb forms included in the NAVI, using temporal adverbs and grammatical markers (e.g., auxiliaries) as indicators of the target form.

## Results

As shown in Figure 1, results from the NAVI revealed a main effect of finiteness ( $F(1, 18) = 30.66, p < .001$ ), indicating that both aphasic groups performed more poorly on finite vs. nonfinite forms (anomic: 81% vs. 99%,  $p = .008$ ; agrammatic: 45% vs. 90%,  $p = .001$ ). There was a main effect of group ( $F(1, 18) = 13.78, p = .002$ ), suggesting overall better performance in anomic compared to agrammatic participants. Importantly, there was a significant interaction between finiteness and group ( $F(1, 18) = 4.843, p = .041$ ). Agrammatic participants performed worse than anomic participants on finite forms (45% vs. 81%,  $p = .005$ ); however, the two groups did not differ for nonfinite form production (90% vs. 99%,  $p = .143$ ).

The results from the Cinderella narrative task revealed no main effect of finiteness ( $F(1, 18) = 2.33, p = .110$ ), indicating only numerically lower performance on finite vs. nonfinite forms in both agrammatic (86% vs. 92%) and anomic participants (97% vs. 100%). The main effect of group also was not reliable ( $F(1, 18) = 3.56, p = .076$ ). In addition, there was no significant interaction between finiteness and group ( $F(1, 18) = .289, p = .592$ ).

## Discussion

The same groups of agrammatic and anomic participants showed different patterns of performance in producing finite vs. nonfinite forms in the structured vs. narrative elicitation tasks. On the NAVI both groups showed greater difficulty with finite compared to nonfinite forms (cf. Bastiaanse, 2011). In addition, agrammatic participants showed greater deficits than anomic participants on finite, but not nonfinite, forms (cf. Lee et al., 2008; LaPointe, 1985). In contrast, the Cinderella narrative task failed to reveal reliable differences between verb inflection types or aphasia types. Taken together, the findings suggest that a structured elicitation task, such as the NAVI, is a more sensitive measure than a narrative production task for examining patterns of verb inflection deficits in individuals with aphasia. Further theoretical and clinical implications will be discussed.

## References

- Arabatzi, M & Edwards, S (2001). Tense and syntactic processing in agrammatic speech. *Brain and Language*, 80, 314-327.
- Bastiaanse, R. (2011). The retrieval and inflection of verbs in the spontaneous speech of fluent aphasic speakers. *Journal of Neurolinguistics*, 24, 163-172.
- Kertesz, A. (2006). *Western Aphasia Battery – Revised*. PscyCorp. San Antonio, TX.
- LaPointe, S. G. (1985). A theory of verb form use in the speech of agrammatic aphasics. *Brain and Language*, 24, 100-155.
- Lee, J. & Thompson, C. K. (experimental version). Northwestern Assessment of Verb Inflection.
- Lee, J., Milman, L, & Thompson, C. K. (2008). Functional category production in English agrammatism. *Aphasiology*, 22, 893-905.
- Thompson, C. K. (experimental version). *Northwestern Assessment of Verbs and Sentences*.
- Thompson, C. K., Cho, S., Hsu, C.-J., Wieneke, C., Rademaker, A., Weitner, B. B., Mesulam, M.-M., & Weintraub, S. (2011). Dissociations between fluency and agrammatism in Primary Progressive Aphasia. *Aphasiology*, *iFirst*, 1-24.

**Figure 1.** Production accuracies for finite vs. nonfinite verb forms across tasks and aphasic groups

